

I. IDENTIFICATION DATA

Thesis title:	Dynamic Diffuse Global Illumination
Author's name:	Michal Hvězda
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Computer Graphics and Interaction
Thesis reviewer:	Ing. Martin Káčerik
Reviewer's department:	Department of Computer Graphics and Interaction

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
Project required solid knowledge of light transport theory as well as study of recent literature.	

Fulfilment of assignment	fulfilled
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
All specified requirements are met.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	

Technical level	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
Topic and related work seem to be well understood.	

Formal and language level, scope of thesis	B - very good.
<i>Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?</i>	
Formal and language level is very good, with small number of typos and stylistic errors. The work is well-presented. However, I personally find the text slightly chaotic - overall structure, as well as presentation of the results, could be improved.	

Selection of sources, citation correctness	A - excellent.
<i>Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?</i>	
Chosen literature is relevant and well cited. Original work is clearly distinguished from earlier work.	

Additional commentary and evaluation (optional)
<i>Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.</i>
Student proposes new ways of overcoming the shortcomings of previous work, as well as novel shadowing algorithm inspired by previous work, both with promising results.
Provided application distribution is missing external DLLs.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

This thesis presents implementation of recent and quite involved algorithm, Dynamic diffuse global illumination with ray-traced irradiance fields. It provides brief introduction to the topic, basics of light transport theory and overview of methods trying to solve global illumination. Description of the DDGI algorithm is followed by proposal of two improvements: probe field culling based on geometric occlusion (improving performance and robustness) and irradiance fields cascade (improving precision of the approximation based on viewer position). On top of that, novel DDGI based shadowing algorithm is presented, allowing interactive rendering of soft-shadows approximation.

Resulting implementation is hybrid renderer with cooperating raytracing and rasterization. Most of the work is accelerated on the GPU and according to presented results, running in interactive framerates (depending on the scene and algorithm settings).

Speaking of presented results, even thou they seem valid and promising, their presentation is quite difficult to follow and could have been better thought through.

The grade that I award for the thesis is **A - excellent**.

Questions:

1. Qualitative results (Fig. 7.3, Tab. 7.1) are showing similar error on regions with dominant direct lighting and regions lit purely by indirect light, approximated by the probes. Can you comment, why is this the case?
2. On some surfaces, shadowing algorithm is forming regular, grid-like patterns on the shadow boundary (also visible in provided video). Could it be avoided?

Date: **9.6.2022**

Signature: